

## UPPER TRISHULI-1 HEP (216MW)

|                            |                                                   |
|----------------------------|---------------------------------------------------|
| <b>Client</b>              | <b>Doosan Heavy Industries &amp; Construction</b> |
| <b>DHI's Subcontractor</b> | <b>Power Construction Corporation of China</b>    |

### Reply comments

|                   |                                                          |                              |                |
|-------------------|----------------------------------------------------------|------------------------------|----------------|
| Subcontractor     | <b>Power Construction Corporation of China</b>           |                              |                |
| Title of Document | Layout Drawing Investigation Tunnel for Powerhouse Rev.A |                              |                |
| Document No.      | TJ/UT1/OUT-08                                            | <b>Reviewed Note No.</b>     | <b>RN-0010</b> |
|                   |                                                          | <b>Present Review status</b> | <b>RR</b>      |
| Date of Documents | 20.09.2021                                               | Received                     | 20.09.2021     |
| Reply Comments    | RC-0004                                                  | Present Reply date           | 31.10.2021     |

### General Reply comments:

The following comments refer to the marked drawing:



d) Select one uniform gradient for the entire tunnel, wherever the turning bay will be located.

Reply: Accept and modified. Now the uniform gradient for the entire tunnel is adjusted to 7.17%.

e) Geological structures must not be indicated in this drawing. A small table of major joints sets is sufficient.

Reply: The occurrence of joints and mechanical parameter of joints in the investigation tunnel has been added to the drawings.

f) Provide one row with "Overburden Thickness" (= rock cover thickness).

Reply: "Overburden Thickness" has been added to the properties table.

g) It is for construction reasons preferable that the tunnel enters the Powerhouse at its roof, i.e., the roof the tunnel, when entering the Powerhouse is at the same elevation as the roof of the Powerhouse. Countercheck with the current Powerhouse design and revise.

Reply: Because the length of the crown rock dowels of the powerhouse is 8m, in order to facilitate the installation of the crown rock dowels during the excavation of the first floor of the powerhouse, we plan to excavate the first floor of the powerhouse to 9m, and we plan to use double-boom jumbo for drilling construction. Considering the convenient construction traffic, we suggest that the bottom elevation of the ventilation tunnel should

be consistent with that of the excavation of the first floor of the powerhouse.

h) Safety instructions are not needed on a layout drawing. Delete. They should appear in the Method Statement for the tunnel.

Reply: Agree to delete.

i) See separate notes below.

j) Provide the reference drawings/documents in this list.

Reply: Accept and modified.

a) Delete this comment. It is related to construction and not to layout. Such comment should appear in the Method Statement or on construction drawings.

Reply: Agree to delete.

b) Same as under a).

Reply: Agree to delete.

#### NOTE

1. This set of drawings are for the excavation and initial support of investigation tunnel for the powerhouse.
2. All dimensions are in millimeters, and coordinates, chainages & elevations are in meters.
3. Before excavation, the upper slope of the tunnel portal should be cleaned; before removing or  the loose block which has a major influence on the slope stability, the site geological engineer should be consulted.
4. The wedges  joints combination on the roof shall be  red timely.
5. Tunnel excavation should be smooth, and attention  be paid to rockburst.
6. The excavation span at the intersection of the investigation  and the turning adit is large, and  should be paid to timely support to ensure safety.
7. The excavation and support types of the tunnel inlet and tunnel  can be adjusted by the designer according to the actual situation after the geological conditions are revealed.
8. The end position of the investigation tunnel may be adjusted according to the final position and section size of the powerhouse.
9. The location of the turning adit may be adjusted according to the actual rock conditions.

c) Same as under a). Note, there is no rock burst to be expected in the project, so far.

Reply: Agree to delete.

d) Same as under a).

Reply: Agree to delete.

e) Modify this comment: The Designer shall provide alternatives and options in the tunnel support design, so that the support can be adjusted in case geological conditions are varying.

Reply: The excavation and support methods of the tunnel portal can be adjusted according to the actual situation after the geological conditions are revealed.